

# PATENT ABSTRACTS OF JAPAN

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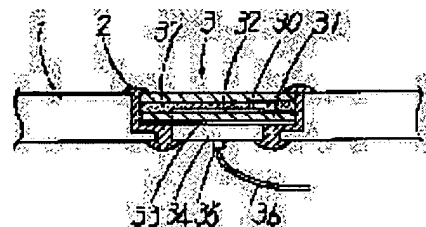
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## (54) ANTENNA FOR AUTOMOBILE

### (57)Abstract:

**PURPOSE:** To improve the non-directivity and reception gain by making the vertical normal direction of the antenna face by providing a hole on the body roof of an automobile and embedding a micro strip antenna(MS antenna) consisting of a glass substrate or the like.

**CONSTITUTION:** An MS antenna 3 is embedded into the body roof 1 of the automobile through a resin frame 2 made of PVC and urethane, etc. The MS antenna 3 is composed of a laminated glass and consisting of an outer glass 30 being an external dielectric board, an inner glass 31 being an inside dielectric board, and an intermediate film 37 made of PVB. A circular antenna conductor 32 is formed by Ag-based thick film conductor outside the inner glass 31 and a circular grounding conductor 33 inside of it. Further, a hole for power supply from an antenna conductor 32 is provided on the prescribed position of the inner glass 31. The conductor is filled in the hole, thereby leading it to the input terminal of an amplifier 34 provided on the grounding conductor 33.



## LEGAL STATUS

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**CLAIMS**

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[Claim(s)]

[Claim 1] It consists of an interlayer which has the dielectric which intervened between an outside dielectric board, inside dielectric boards, and these dielectric boards. A conductor is prepared. the field [ by the side of in the car / of the dielectric board of this outside ], or field top of the vehicle outside of the dielectric board of this inside -- an antenna -- The ground edge of this amplifier is connected with a conductor, respectively. and the field by the side of in the car [ of the dielectric board of this inside ] -- grounding -- a conductor and amplifier -- preparing -- this antenna -- a conductor, the input edge of this amplifier, and this grounding -- The antenna for automobiles which considers as a micro-stripe antenna and is characterized by attaching in the hole in which this micro-stripe antenna was formed to the body roof of an automobile.

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the antenna for automobiles.

[0002]

[Description of the Prior Art] Conventionally, the structure of various antennas is examined in the automobile and the telephone for aircrafts used in a UHF band, the satellite communication field, etc. The system which used the signal of a GPS satellite especially by position detection of an automobile is known. As an antenna used for this, the micro-stripe antenna (MS antenna) with which an automobile sheathing portion is equipped conventionally is proposed by JP, 2-172304, A.

[0003] In this conventional example, it is needed that it is indispensable to install amplifier near the antenna in order to receive certainly the feeble signal transmitted from a GPS satellite, and the direction of a normal of the antenna formed on the flat surface is perpendicularly near. However, in the glass antenna currently formed in the rear glass of an automobile etc., the direction of a normal of rear glass was installed in many cases near level from the design of an automobile, or the limit of a visual field, therefore it was compensating with optimization of an antenna filament pattern.

[0004]

[Problem(s) to be Solved by the Invention] When it is made  $1/2 - 1/4$  wave of antenna size of a conveyance electric wave, the RF energy received with the antenna is feeble, and transmitting to a receiver through a coaxial cable becomes difficult in a UHF band, especially as the miniaturization of an antenna progresses. Then, although amplifier is needed near the antenna, in the case of a flat antenna, it is influenced by directivity as an automotive application, and is not necessarily satisfied only with amplifier. Especially an angle setup of the antenna currently formed in the rear glass side of an automobile has the fault which it is limited by the design of a type of a car, and the direction of a normal of an antenna side cannot receive easily again since it is horizontally near.

[0005]

[Means for Solving the Problem] this invention is made that the above-mentioned technical problem should be solved. An outside dielectric board, It consists of an interlayer which has the dielectric which intervened between inside dielectric boards and these dielectric boards. A conductor is prepared. the field [ by the side of in the car / of the dielectric board of this outside ], or field top of the vehicle outside of the dielectric board of this inside -- an antenna -- The ground edge of this amplifier is connected with a conductor, respectively. and the field by the side of in the car [ of the dielectric board of this inside ] -- grounding -- a conductor and amplifier -- preparing -- this antenna -- a conductor, the input edge of this amplifier, and this grounding -- The antenna for automobiles which considers as a micro-stripe antenna and is characterized by attaching in the hole in which this micro-stripe antenna was formed to the body roof of an automobile is offered.

[0006]

[Example] Hereafter, according to a drawing, an example is explained in detail.

The cross section of the micro-stripe antenna applied to an example 1 at [example 1] drawing 1 is shown. The micro-stripe antenna 3 is embedded through the resin frames 2, such as PVC and a product made from urethane, to the body roof 1 of an automobile. The composition of the MS antenna 3 consists of laminated glass, 30 is outside dielectric board slack shell plate glass, and 31 is the interlayer of the product [ 37 ] made from PVB with inside dielectric board slack inner-plate glass here.

[0007] the outdoor side of inner-plate glass 31 -- a circle-like antenna -- a conductor 32 -- moreover, an interior-of-a-room side -- circle-like grounding -- a conductor 33 forms by Ag system thick film conductor, respectively -- having -- \*\*\*\* -- further -- the position of this inner-plate glass 31 -- an antenna -- the hole for the electric supply from a

conductor 32 -- preparing -- this -- a hole -- a conductor -- being filled up -- this grounding -- it leads to the input edge of amplifier 34 established in the front face of a conductor 33 an antenna -- a conductor 32 and grounding -- although a conductor 33 has the desirable shape of a circle for considering as indirectivity, it can be used even if it is an ellipse, a polygon, etc.

[0008] Moreover, these thick film conductors may not be limited to Ag system, but may be \*\*\*\* besides being the thick film of Cu and Au systems etc., a copper plate, etc. Moreover, the coaxial cable 36 for RFs is directly connected to amplifier 34 through the connector 35. The used semiconductor of the circuit of amplifier 34 uses gallium-arsenide FET, the low-noise transistor for microwave, etc. Moreover, shell plate glass 30, inner-plate glass 31, and interlayers 37 may be dielectric \*\*\*\* or layers, such as other glass plates and a ceramic board, etc. in addition, an antenna -- the conductor 32 may be formed in the in-the-car side of shell plate glass 30

[0009] In [example 2] drawing 1, the thickness of 2.5mm and the quality of the material used the thing of a soda lime (dielectric constant 7) as inner-plate glass. a circle-like antenna -- the diameter of a conductor -- 40mm -- carrying out -- circle-like grounding -- the conductor was used as the pattern which covered the antenna enough in the position which counters this antenna, and was made into the diameter of 50mm The relative value was shown having used gain of a dipole antenna as 0dB for the gain data based on this example at drawing 3. Carrier frequency It is 1575.42 MHz. In addition, the angle shown in this data makes 0 times the direction of a transverse plane of an antenna side.

[0010] The cross section of another MS antenna to drawing 2 as a [example 3] example 3 is shown. The micro-stripe antenna is joined to the cover glass 38 which consists of the veneer by adhesives 45. 39 -- the dielectric board of ceramics -- the outdoor side -- an antenna -- a conductor 40 -- moreover, an interior-of-a-room side -- grounding -- a conductor 41 forms by Ag system thick film conductor, respectively -- having -- \*\*\*\* -- further -- this grounding -- amplifier 42 is joined to the front face of a conductor 41 Moreover, the coaxial cable 44 for RFs has connected with amplifier 42 through a connector 43. Antenna performances, such as receiving sensitivity, were almost the same as the example 2.

[0011]

[Effect of the Invention] this invention -- the body roof of an automobile -- a hole -- preparing -- this -- it is embedding the micro-stripe antenna constituted from a glass substrate etc. by the hole, and the direction vertical of a normal of an antenna side is accomplished, and the effect indirectivity and whose receiving gain improve is done so

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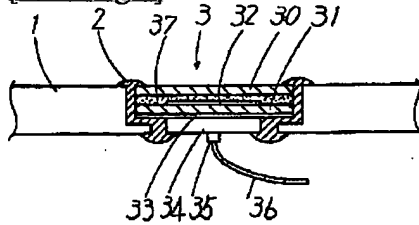
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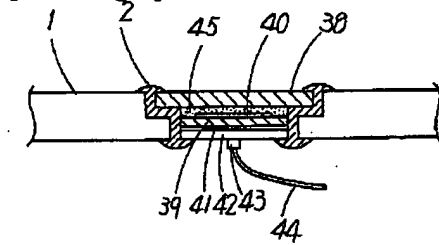
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## DRAWINGS

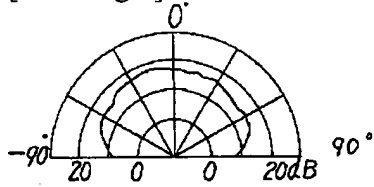
[Drawing 1]



[Drawing 2]



[Drawing 3]



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